Power Oscillation Damping from VSC-HVDC Connected Offshore Wind Power Plants - DTU Orbit (09/11/2017)

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The implementation of power oscillation damping service on offshore wind power plants connected to onshore grids by voltage-source-converter-based high voltage direct current transmission is discussed. Novel design guidelines for damping controllers on voltage-source converters and wind power plant controllers are derived, using phasor diagrams and a test network model and are then verified on a generic power system model. The effect of voltage regulators is analyzed, which is important for selecting the most robust damping strategy. Furthermore, other often disregarded practical implementation aspects regarding real wind power plants are discussed: 1) robustness against control/communication delays; 2) limitations due to mechanical resonances in wind turbine generators; 3) actual capability of wind power plants to provide damping without curtailing production; and 4) power-ramp rate limiters.

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